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most as injurious grapevine mildew, certainly no debt of gratitude is owed to North America, notwithstanding stringent laws, is widely extending the fields of its devastation. A correspondent of *Nature* states that it has already made its appearance in the vineyards of Cape Colony. In a few places the pest has been found in swarms, and efforts are being made to stamp it out, or at least hold it in check. Unfortunately the habits of the insect are such that it is hardly possible that the calamity threatening the grape-growing interests there can be wholly averted.

#### THE NAVAL OBSERVATORY.

THE report of the National academy of sciences upon the naval observatory demands attention, not only from all interested in scientific affairs, but from those who desire only to see good administration. In reading the report, the first question to present itself to the mind of the candid inquirer would be, How does it happen that the national observatory of the country has remained so long under the direction of superintendents who were not astronomers, and whose profession has little direct relation to its work? A partial answer to this question, from the naval point of view, is found in letters addressed to President Barnard by the present superintendent, and published as an appendix to the report. In justice to Commodore Belknap, we must say that his arguments bear rather upon the question of the usefulness of the institution to the navy than upon that we have just suggested; but the two are so closely related, that, in answering one, he evidently intends to answer the other. It will therefore be interesting to examine his arguments, and note their bearings upon the several points at issue.

Commodore Belknap cites seven kinds of services which the observatory renders to the navy. A very slight consideration will, however, show that every one of these services could be rendered as well or far better by a national observatory under civilian authority; and, indeed, by an establishment far more modest in its outfit than even the present naval observatory, to say nothing of the projected new one. The navy-yards could get their time from the nearest railway-station with ample accuracy for business purposes. Naval ships in port could compare their chronometers with signals from a national observatory as well as the mercantile marine could, and any superiority for naval purposes which might in-

vest a time-signal tapped over the wires by the hand of a commissioned officer might fairly be deemed counterbalanced by the skill of a civilian astronomer trained in this special business. The naval chronometers could be kept, tested, and rated at least as thoroughly at a national observatory as they are at the present naval observatory. Indeed, this is actually done at the Greenwich observatory, for all the chronometers purchased for the British navy. It could be better done at the Brooklyn navy-yard, whence most ships take their departure, by erecting and equipping a little observatory for this purpose at a cost of ten or fifteen thousand dollars, thus saving the expense, and danger to the rates of chronometers, incurred by transporting them back and forth between New York and Washington.

That officers who had never worked in an observatory till they went to take charge of one would not find their task smooth sailing, is to be expected; but we should never have anticipated such a picture of difficulties of administration as is held up by Commodore Belknap in one of his letters which appears in this report. It seems that Prof. Newcomb, in a letter to President Barnard, drew attention to the curious fact, that during the first twenty years of the existence of the observatory, when two instruments, the transit and the mural circle, were required to completely determine the position of a star, there was no concert of action between the observers with these instruments by which they should observe the same stars. Commenting on this subject, Commodore Belknap remarks, "It may be considered as an ideal state of things where two men of equal age and upon equal footing (with no military ideas of subordination) can engage in work upon two instruments, with but one clock and one chronograph between them, and have every thing go smoothly and without jealousy. The abandonment of the too ambitious programme first laid down was a matter of necessity, which it is probable no one regretted more than the superintendent."

To appreciate this picture, we have to reflect that only one of the observers needed a chronograph, and that the only use either of them had to make of the clock was to look at it. We are therefore led to infer, as the outcome of forty years' experience, that under naval discipline it is not found possible for two civilian astronomers to take their time from the same clock without friction and jealousy; that in consequence a well-

planned but too ambitious programme of work, involving a concert of action between two such observers, had to be abandoned; and that the work of forming a star-catalogue had to be postponed until it could be done with a single instrument.

We have no grounds for challenging the accuracy of this statement. Two opposite conclusions are, however, drawn from it. The view taken by the naval superintendents is, in brief, this: if line-officers of the navy, trained from youth in the art of managing men and making them work together, cannot get two men to work in the same room, observe the same stars, and look at the same clock, what would be the result of intrusting such a task to a civilian astronomer untrained in naval discipline? No organization would last a week under such a *régime*. The view of the civilian astronomer is, that all the trouble is a necessary consequence of placing the work in charge of a man who knows nothing about its execution. Between these views we leave our readers to decide for themselves.

The commodore alludes to the 'so-called scientific men of the country' who want a national observatory, in terms which do not strike us as happily chosen. He tells these misguided men that 'the navy will take no responsibility' for their observatory, in a tone which evidently implies that the threatened absence of this responsibility would impress them with a deep sense of their rashness. Whether the commodore's threat will have this effect is a question for future consideration, and we shall dismiss the subject with a single remark. It has often been said that there is hardly a graduate of the naval academy who is not ready, with great alacrity and at a moment's notice, to take charge of the coast survey, the fish commission, or any other scientific work, without any consciousness that he is undertaking a more formidable task than standing watch on the deck of a ship. We have always looked upon this statement as a humorous exaggeration; but it is hardly possible to read Commodore Belknap's utterances without a feeling that the remark may have more truth in it than we had supposed.

#### THE SWAMPS OF THE UNITED STATES.

THE conditions which have determined the occupation of land in the United States differ widely from those which have controlled the settlement

of most other countries. In other states there have been political or geographical limits which have greatly restrained the movements of population. In this country there has been, from the beginning to the present day, an abundance of good, readily subjugable land awaiting the settler. It is evident, however, that within this decade we pass from this old condition where excellent land was to be had for the asking. Before 1890 all such fields will have been occupied. There will be no more rich frontier lands ready to welcome the immigrant: therefore the tide of immigration will be turned upon the areas which have been passed in the swift westward movement of our population. These neglected districts are of great extent and very varied nature. They consist, in part, of land which is somewhat less fertile than the best soils, but which in every other respect is fit for tillage. In larger part, however, these unoccupied districts, which constitute the land-reserves of the United States, afford soils which contain the elements required for the most profitable crops; but they are rendered infertile by an excess or a deficiency of water. In the arid but irrigable regions, and in the inundated or swamp lands, we have a very large tillable area which may be won to agriculture; and, when so won, these lands will afford resources of the utmost importance to the people.

In his report on the lands of the arid region of the United States, published in 1879, Major J. W. Powell has given an admirable account of those districts where the soils suffer from a deficiency of water, and in the preface to that report he notes the importance of the class of inundated lands; but so far, no detailed studies of the latter class of lands have been prepared. Recently, however, Major Powell has organized a division of the U. S. geological survey, which is charged with a careful inquiry into the geological history and physical conditions of the swamps and other inundated lands of the country.

A preliminary study of the field has shown the remarkable fact, that, owing to the abundance of cheap land which could be easily won to tillage, we have left untouched, in the region east of the Mississippi, districts of easily drained swamp-lands amounting to more than fifty thousand square miles of area. These lands have the same nature as those which, in England and the states of northern Europe, were drained centuries ago, and now afford the most fertile fields of those countries. The inundated lands of the seaboard region of the United States, as well as the lands of the lower Mississippi, remain in the state in which they were when first seen by men, while the similar areas in England were long ago won